

WHAT IS CLAIMED IS:

1. A culturing method which provides for maintenance of avian primordial germ cells for prolonged periods comprising the following steps:

- (i) isolating primordial germ cells from a desired avian; and
- (ii) culturing said primordial germ cells in a culture medium containing at least the following growth factors contained in amounts sufficient to maintain said PGCs for prolonged periods in tissue culture:

- (1) leukemia inhibitory factor (LIF),
- (2) basic fibroblast growth factor (bFGF),
- (3) stem cell factor (SCF) and
- (4) insulin-like growth factor (IGF-I), for a prolonged time period.

2. The method of Claim 1, wherein the minimal amounts of said growth factors preferably range from:

- (1) LIF 0.1 U/ μ l to 100.0 U/ μ l
- (2) bFGF 4.0 pg/ μ l to 4000 pg/ μ l
- (3) IGF-I 6.0 pg/ μ l to 6000.0 pg/ μ l, and
- (4) SCF 8.0 pg/ μ l to 8000 pg/ μ l.

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3. The method of Claim 2, wherein the amounts of said growth factors more preferably range from

- (1) LIF 1.0 U/ μ l to 10.0 U/ μ l
- (2) bFGF 40.0 pg/ μ l to 400.0 pg/ μ l
- (3) IGF-I 60.0 pg/ μ l to 600.0 pg/ μ l, and
- (4) SCF 80.0 pg/ μ l to 800.0 pg/ μ l.

4. The method of Claim 1, wherein said avian PGCs are obtained from an avian of the genus *Gallinacea*.

5. The method of Claim 4, wherein said PGCs are chicken PGCs or turkey PGCs.

6. The method of Claim 1, wherein said PGCs are maintained in culture for at least 14 days.

7. The method according to Claim 6, wherein said PGCs are maintained in culture for at least 25 days.

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8. The method according to Claim 7, wherein said PGCs are maintained in culture for at least 4 months.

9. The method of Claim 1, which further comprises:

(iii) transfecting or transforming the resultant PGCs with a desired nucleic acid sequence.

10. The method of Claim 9, wherein said nucleic acid sequence encodes a therapeutic polypeptide.

11. An improved method of producing chimeric avians which comprises:

(i) isolating primordial germ cells from an avian;
(ii) maintaining such PGCs in a tissue culture medium containing at least the following growth factors;

5 (1) leukemia inhibitory factor (LIF),
(2) basic fibroblast growth factor (bFGF),
(3) stem cell factor (SCF) and
(4) insulin-like growth factor (IGF-I);

(iii) transferring said PGCs into a recipient avian embryo; and

(iv) selecting for chimeric avians which have the desired PGC phenotype.

12. The method according to Claim 11, wherein said PGCs are derived from avian embryos of the genus *Gallinacea*.

13. The method according to Claim 12, wherein said avian embryos are turkey or chicken embryos.

14. The method according to Claim 11, wherein said PGCs are transfected or transformed with a desired nucleic acid sequence prior to transferral to a recipient avian embryo.

15. The method according to Claim 14, wherein said nucleic acid sequence encodes a therapeutic polypeptide.

16. The method according to Claim 15, which further includes purifying said therapeutic polypeptide from the eggs of the chimeric avians produced according to step (iv).

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17. The method according to Claim 16, which further includes purifying said therapeutic polypeptide from the eggs of the chimeric avians produced according to step (iv).

18. The method according to Claim 11, wherein the PGCs are injected into the dorsal aorta and/or marginal vein of a recipient avian embryo or into recipient blastoderms.

19. An avian PGC cell line obtained by the culturing method of Claim 1.

20. The cell line of Claim 18, which is a chicken or turkey PGC cell line.

21. The cell line of Claim 18, which contains an inserted nucleic acid sequence.

